WHAT IS CLAIMED IS:

1. A radio signal parallel processing apparatus which receives and processes in parallel a first carrier signal of a frequency $\omega 1$ and a second carrier signal of a frequency $\omega 2$ ($\omega 2 > \omega 1$), the apparatus comprising:

a first local oscillator which outputs a signal of a frequency ω as an output signal of the first local oscillator;

a first frequency mixer which receives the first carrier signal and the signal of the frequency ω, and frequency converts the first carrier signal into a first signal of a first intermediate frequency (ω - $\omega 1$) and a first signal of another first intermediate frequency (ω + $\omega 1$), and outputs the first signals of the first intermediate frequencies (ω - $\omega 1$) and (ω + $\omega 1$) as output signals of the first frequency mixer; and

a second frequency mixer which receives the second carrier signal and the signal of the frequency ω, and frequency converts the second carrier signal into a second signal of a first intermediate frequency ($\omega 2$ - ω) and a second signal of another first intermediate frequency ($\omega 2$ + ω) and outputs the second signals of the first intermediate frequencies ($\omega 2$ - ω) and (2ω + ω) as output signals of the second frequency mixer.

2. The apparatus of claim 1, wherein the frequency ω of the output signal of the first local oscillator is substantially equal to ($\omega 2$ + $\omega 1$)/2,

which is an average frequency of the frequency $\omega 1$ and the frequency $\omega 2$, and $(\omega - \omega 1)$, which is the first intermediate frequency $(\omega - \omega 1)$ of one of the output signals of the first frequency mixer, and $(\omega 2 - \omega)$, which is the first intermediate frequency $(\omega 2 - \omega)$ of one of the output signals of the second frequency mixer, are each substantially equal to $(\omega 2 - \omega 1)/2$.

3. The apparatus of claim 2, further comprising:

a first channel selection filter which receives the outputs of the first frequency mixer, removes the first signal of the first intermediate frequency $(\omega + \omega 1)$, and outputs the first signal of a first intermediate frequency $(\omega 2 - \omega 1)/2$ as an output signal of the first channel selection filter, wherein the first signal of the first intermediate frequency $(\omega - \omega 1)$ is substantially equal to the first signal of the first intermediate frequency $(\omega 2 - \omega 1)/2$;

a second channel selection filter which receives the outputs of the second frequency mixer, removes the signal of the first intermediate frequency $(\omega 2 + \omega)$, and outputs the second signal of the first intermediate frequency $(\omega 2 - \omega 1)/2$ as an output signal of the second channel selection filter, wherein the second signal of the first intermediate frequency $(\omega 2 - \omega)$ is substantially equal to the second signal of the first intermediate frequency $(\omega 2 - \omega 1)/2$;

a frequency distributor which receives the signal of the frequency $(\omega 1 + \omega 2)/2$ from the first local oscillator and outputs a signal of a frequency $(\omega 1 + \omega 2)/2N$ as an output signal of the frequency distributor;

a third frequency mixer which receives the first signal of the first intermediate frequency (ω2 – ω1)/2 from the first channel selection filter and the signal of the frequency (ω1 + ω2)/2N from the frequency distributor, frequency converts the first signal of the first intermediate frequency (ω2 – ω1)/2 into a first signal of a second intermediate frequency ((ω1 + ω2)/2N - (ω2 – ω1)/2) and a first signal of another second intermediate frequency ((ω1 + ω2)/2N + (ω2 – ω1)/2), and outputs the first signals of the second intermediate frequencies ((ω1 + ω2)/2N - (ω2 – ω1)/2) and ((ω1 + ω2)/2N + (ω2 – ω1)/2) as output signals of the third frequency mixer; and

a fourth frequency mixer which receives the second signal of the first intermediate frequency (ω2 – ω1)/2 from the second channel selection filter and the signal of the frequency (ω1 + ω2)/2N from the frequency distributor, frequency converts the first signal of the first intermediate frequency (ω2 – ω1)/2 into a first signal of the second intermediate frequency ((ω1 + ω2)/2N - (ω2 – ω1)/2) and a first signal of the another second intermediate frequency ((ω1 + ω2)/2N + (ω2 – ω1)/2) and outputs the first signals of the second intermediate frequencies ((ω1 + ω2)/2N - (ω2 – ω1)/2) and ((ω1 + ω2)/2N + (ω2 – ω1)/2) as output signals of the fourth frequency mixer.

4. The apparatus of claim 3, wherein the value N of the frequency distributor is determined so that the frequency of the output signal of the frequency distributor, the frequency of the output signal of the first channel

selection filter, and the frequency of the output signal of the second channel selection filter are substantially equal.

5. The apparatus of claim 2, further comprising:

a first channel selection filter, which receives the output signals of the first frequency mixer, removes the first signal of the first intermediate frequency ($\omega + \omega 1$), and outputs the first signal of a first intermediate frequency $(\omega 2 - \omega 1)/2$ as an output signal of the first channel selection filter, wherein the first signal of the first intermediate frequency ($\omega - \omega 1$) is substantially equal to the first signal of the first intermediate frequency $(\omega 2 - \omega 1)/2$;

a second channel selection filter, which receives the output signals of the second frequency mixer, removes the second signal of the first intermediate frequency ($\omega 2 + \omega$), and outputs the second signal of the first intermediate frequency $(\omega 2 - \omega 1)/2$;

a second local oscillator, which outputs a signal of a frequency $(\omega 1 + \omega 2)/2N$ obtained by dividing the frequency $(\omega 1 + \omega 2)/2$ of the output signal of the first local oscillator by N as an output of the second local oscillator;

a third frequency mixer which receives the first signal of the first intermediate frequency $(\omega 2 - \omega 1)/2$ from the first channel selection filter and the signal of the frequency $(\omega 1 + \omega 2)/2N$ from the second local oscillator,

frequency converts the first signal of the first intermediate frequency ($\omega 2 - \omega 1$)/2 into a first signal of a second intermediate frequency (($\omega 1 + \omega 2$)/2N - ($\omega 2 - \omega 1$)/2) and a first signal of another second intermediate frequency (($\omega 1 + \omega 2$)/2N + ($\omega 2 - \omega 1$)/2), and outputs the first signals of the second intermediate frequencies (($\omega 1 + \omega 2$)/2N - ($\omega 2 - \omega 1$)/2) and (($\omega 1 + \omega 2$)/2N + ($\omega 2 - \omega 1$)/2) as output signals of the third frequency mixer; and

a fourth frequency mixer which receives the second signal of the first intermediate frequency ($\omega 2 - \omega 1$)/2 from the second channel selection filter and the signal of frequency ($\omega 1 + \omega 2$)/2N from the second local oscillator, frequency converts the second signal of the first intermediate frequency ($\omega 2 - \omega 1$)/2 into a second signal of the second intermediate frequency (($\omega 1 + \omega 2$)/2N - ($\omega 2 - \omega 1$)/2) and a second signal of another second intermediate frequency (($\omega 1 + \omega 2$)/2N + ($\omega 2 - \omega 1$)/2), and outputs the second signals of the second intermediate frequencies (($\omega 1 + \omega 2$)/2N - ($\omega 2 - \omega 1$)/2) and (($\omega 1 + \omega 2$)/2N + ($\omega 2 - \omega 1$)/2) as output signals of the fourth frequency mixer.

6. The apparatus of claim 5, wherein the value N of the second local oscillator is determined so that the frequency of the output signal of the second local oscillator, the frequency of the output signal of the first channel selection filter, and the frequency of the output signal of the second channel selection filter are substantially equal.

7. The apparatus of claim 3, further comprising:

a third channel selection filter which receives the output of the third frequency mixer, removes the first signal of the other second intermediate frequency (($\omega 1 + \omega 2$)/2N + ($\omega 2 - \omega 1$)/2), and outputs the first signal of the second intermediate frequency (($\omega 1 + \omega 2$)/2N - ($\omega 2 - \omega 1$)/2); and

a fourth channel selection filter which receives the output of the fourth frequency mixer, removes the second signal of the other second intermediate frequency (($\omega 1 + \omega 2$)/2N + ($\omega 2 - \omega 1$)/2), and outputs the second signal of the second intermediate frequency (($\omega 1 + \omega 2$)/2N - ($\omega 2 - \omega 1$)/2).

8. A radio signal parallel processing method by which a first carrier signal of a frequency $\omega 1$ and a second carrier signal of a frequency $\omega 2$ ($\omega 2 > \omega 1$) are received, the method comprising:

(a) generating a first signal of a first intermediate frequency (ω - $\omega 1$) and a first signal of another first intermediate frequency ($\omega + \omega 1$) by frequency converting the first carrier signal; and

(b) generating a second signal of a first intermediate frequency ($\omega 2$ - ω) and a second signal of another first intermediate frequency ($\omega 2 + \omega$) by frequency converting the second carrier signal.

9. The method of claim 8, wherein the frequency ω is substantially equal to $(\omega2 + \omega1)/2$, which is an average frequency of the frequency $\omega1$ and the frequency $\omega2$, and $(\omega - \omega1)$, which is the first intermediate frequency $(\omega + \omega1)$ of step (a), and $(\omega2 - \omega)$, which is the first intermediate frequency $(\omega2 - \omega)$ of step (b), are each substantially equal to $(\omega2 - \omega1)/2$.

10. The method of claim 9, further comprising:

(c) removing the first signal of the first intermediate frequency $(\omega + \omega1)$ generated in step (a) and outputting the first signal of a first intermediate frequency $(\omega2 - \omega1)/2$, wherein the first signal of the first intermediate frequency $(\omega - \omega1)$ is substantially equal to the first signal of the first intermediate frequency $(\omega2 - \omega1)/2$;

(d) removing the second signal of the first intermediate frequency $(\omega2 + \omega)$ generated in step (b), and outputting the second signal of the first intermediate frequency $(\omega2 - \omega1)/2$, wherein the second signal of the first intermediate frequency $(\omega2 - \omega)$ is substantially equal to the second signal of the first intermediate frequency $(\omega2 - \omega1)/2$;

(e) generating a first signal of a second intermediate frequency $((\omega1 + \omega2)/2N - (\omega2 - \omega1)/2)$ and a first signal of another second intermediate frequency $((\omega1 + \omega2)/2N + (\omega2 - \omega1)/2)$ by frequency converting the first

signal of the first intermediate frequency $(\omega 2 - \omega 1)/2$ which is output in step (c); and

(f) generating a second signal of the second intermediate frequency $((\omega 1 + \omega 2)/2N - (\omega 2 - \omega 1)/2)$ and a second signal of the another second intermediate frequency $((\omega 1 + \omega 2)/2N + (\omega 2 - \omega 1)/2)$ by frequency converting the second signal of the first intermediate frequency $(\omega 2 - \omega 1)/2$ which is output in step (d).

11. The method of claim 10, wherein in any one of the steps (e) and (f), the value N is selected as a predetermined value so that the second intermediate frequency $((\omega 1 + \omega 2)/2N - (\omega 2 - \omega 1)/2)$ is substantially equal to 0.

12. The method of claim 10, further comprising:

(g) removing the first signal of the second intermediate frequency $((\omega 1 + \omega 2)/2N + (\omega 2 - \omega 1)/2)$ generated in step (e) and outputting the first signal of the second intermediate frequency $((\omega 1 + \omega 2)/2N - (\omega 2 - \omega 1)/2)$; and

(h) removing the second signal of the second intermediate frequency $((\omega 1 + \omega 2)/2N + (\omega 2 - \omega 1)/2)$ generated in step (f), and outputting the second signal of the second intermediate frequency $((\omega 1 + \omega 2)/2N - (\omega 2 - \omega 1)/2)$.

13. A radio signal parallel processing apparatus for receiving and processing in parallel a first signal of a frequency $\omega 1$ and a second signal of a frequency $\omega 2$ ($\omega 2 > \omega 1$), the apparatus comprising:

a first oscillating means for outputting a first oscillating signal of a frequency ω as an output signal of the first oscillating means for outputting;

a first mixing means for receiving the first signal of the frequency $\omega 1$ and the first oscillating signal of the frequency ω, and outputting a first mixing output comprising:

an A1 frequency ($\omega - \omega 1$) component and

an A2 frequency ($\omega + \omega 1$) component; and

a second mixing means for receiving the second signal of the frequency $\omega 2$ and the first oscillating signal of the frequency ω, and outputting a second mixing output comprising:

a B1 frequency ($\omega 2 - \omega$) component and

a B2 frequency ($\omega 2 - \omega$) component.

14. The apparatus of claim 13, wherein the first oscillating signal of the frequency ω comprises an average of the frequency $\omega 1$ and the frequency $\omega 2$, and ($\omega - \omega 1$) and ($\omega 2 - \omega$) are each substantially equal to ($\omega 2 - \omega 1$)/2.

15. The apparatus of claim 14, further comprising:

a first filtering means receiving the first mixing output, removing the A2 frequency ($\omega + \omega 1$) component, and outputting the A1 frequency ($\omega - \omega 1$) component as a first filtered output of a frequency ($\omega 2 - \omega 1$)/2;

a second filtering means receiving the second mixing output, removing the B2 frequency ($\omega 2 + \omega$) component, and outputting the B1 frequency ($2\omega - \omega$) component as a second filtered output of frequency ($\omega 2 - \omega 1$)/2;

a processing means for receiving the first oscillating signal of the frequency ω and outputting a processing signal of a frequency ($\omega 1 + \omega 2$)/2N;

a third mixing means receiving the first filtered output of the frequency ($\omega 2 - \omega 1$)/2 and the processing signal of the frequency ($\omega 1 + \omega 2$)/2N, and outputting a third mixed output comprising:

a C1 frequency (($\omega 1 + \omega 2$)/2N - ($\omega 2 - \omega 1$)/2) component and

a C2 frequency (($\omega 1 + \omega 2$)/2N + ($\omega 2 - \omega 1$)/2) component; and

a fourth mixing means receiving the second filtered output of the frequency ($\omega 2 - \omega 1$)/2 and the processing signal of the frequency ($\omega 1 + \omega 2$)/2N, and outputting a fourth mixed output comprising:

a D1 frequency (($\omega 1 + \omega 2$)/2N - ($\omega 2 - \omega 1$)/2) component and

a D2 frequency (($\omega 1 + \omega 2$)/2N + ($\omega 2 - \omega 1$)/2) component.

16. The apparatus of claim 15, further comprising:

a third filtering means receiving the third mixed output, removing the C2 frequency $((\omega 1 + \omega 2)/2N + (\omega 2 - \omega 1)/2)$ component, and outputting the C1 frequency $((\omega 1 + \omega 2)/2N - (\omega 2 - \omega 1)/2)$ component; and

a fourth filtering means receiving the fourth mixed output, removing the D2 frequency $((\omega 1 + \omega 2)/2N + (\omega 2 - \omega 1)/2)$ component, and outputting the D1 frequency $((\omega 1 + \omega 2)/2N - (\omega 2 - \omega 1)/2)$ component.